



EPN Rapid Analysis Products - *Update* -

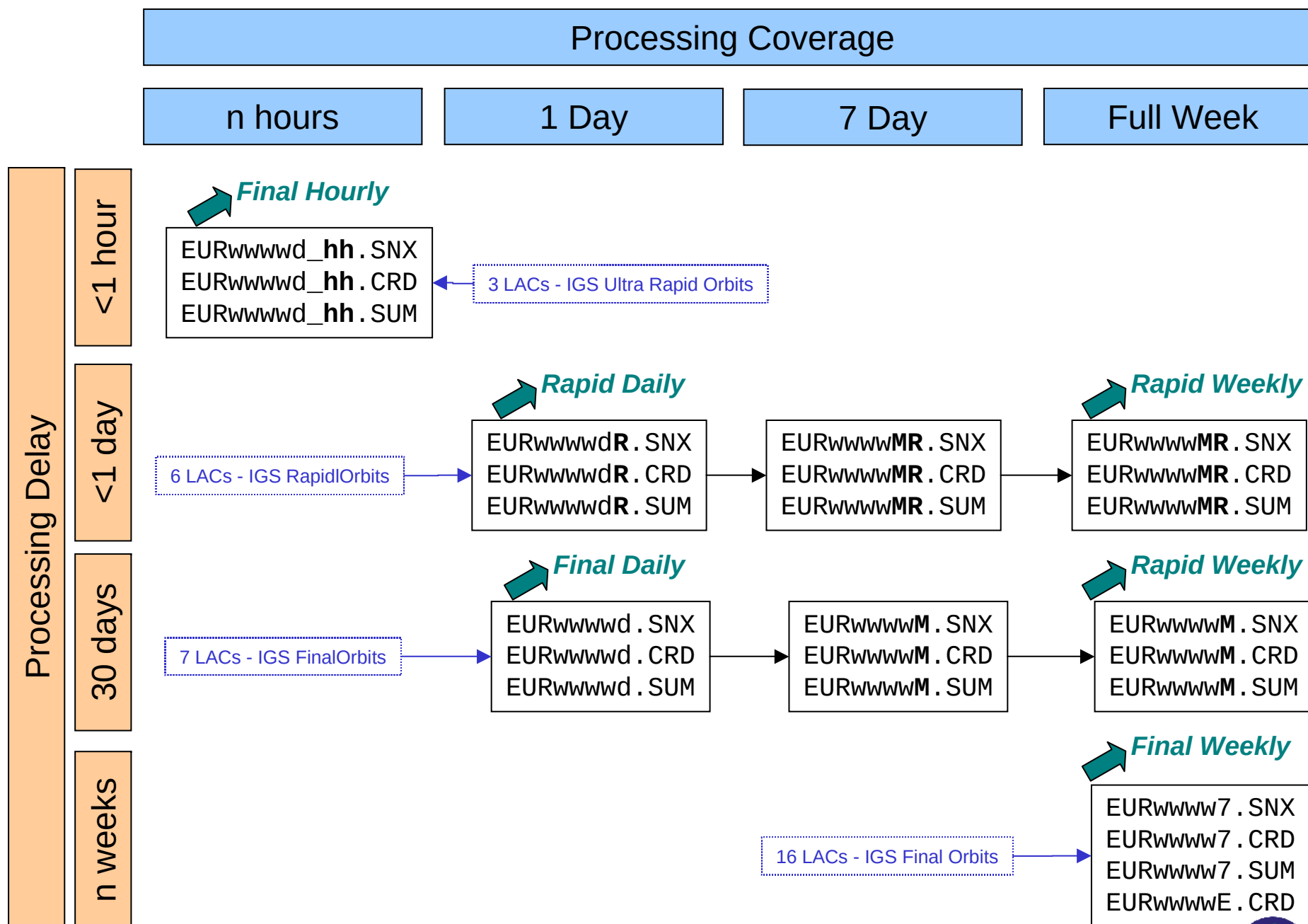
Heinz Habrich

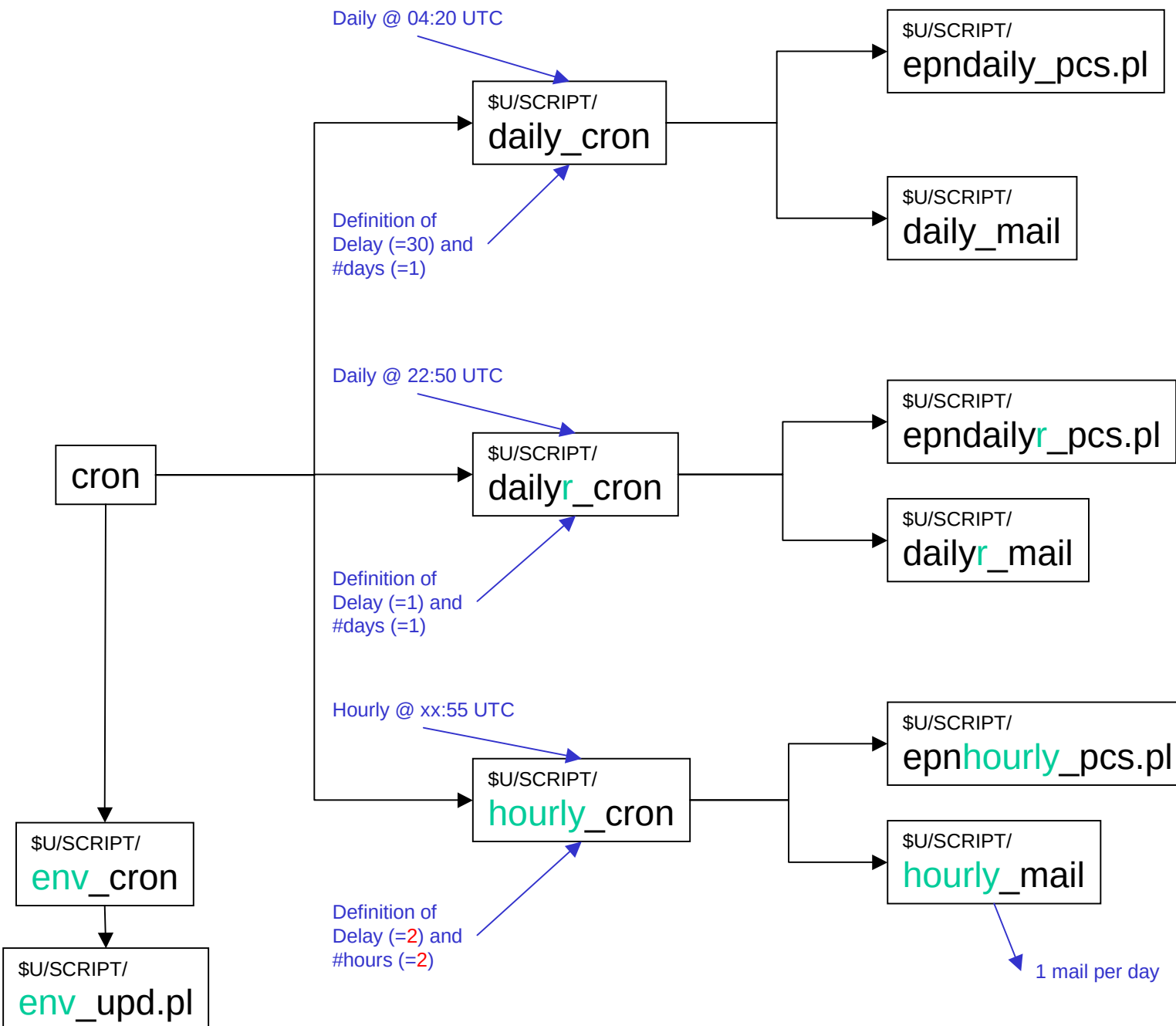
EPN Analysis Coordinator

Federal Agency for Cartography and
Geodesy, Frankfurt, Germany

EPN Rapid Analysis Products

- Scope:
 - Short latency of solutions
 - High resolution coordinates
 - Monitoring





Hourly Combination – Daily report

Hourly Summary for day 14721

Hour	#Sol.	#Sta.	Repeatability (mm)			Local Analysis Centres					
			N	E	U	RMS Helmert Transformation (mm)					
00	3	120	3.92	4.33	15.03	ASI(	0.14)	BKG(	6.66)	LPT(	2.34)
01	3	118	3.63	5.03	9.47	ASI(	0.18)	BKG(	4.48)	LPT(	2.35)
02	3	120	4.30	7.09	9.65	ASI(	0.22)	BKG(	5.04)	LPT(	3.02)
03	3	118	2.93	4.92	7.94	ASI(	0.15)	BKG(	3.86)	LPT(	1.53)
04	3	121	5.86	6.91	14.63	ASI(	0.21)	BKG(	6.90)	LPT(	2.74)
05	3	124	4.46	9.01	10.22	ASI(	0.91)	BKG(	6.01)	LPT(	2.53)
06	3	122	11.23	31.07	14.74	ASI(	0.18)	BKG(	15.04)	LPT(	2.91)
07	3	121	3.64	8.85	7.62	ASI(	0.18)	BKG(	4.85)	LPT(	2.89)
08	3	116	2.48	4.34	6.26	ASI(	0.15)	BKG(	2.87)	LPT(	2.68)
09	3	121	15.54	31.43	12.71	ASI(	1.09)	BKG(	15.89)	LPT(	2.60)
10	3	109	1.89	3.93	5.68	ASI(	1.95)	BKG(	2.56)	LPT(	0.58)
11	3	121	2.72	3.94	7.02	ASI(	1.14)	BKG(	3.41)	LPT(	2.16)
12	3	120	2.67	4.76	6.51	ASI(	1.13)	BKG(	3.46)	LPT(	1.96)
13	3	121	4.89	9.06	8.53	ASI(	1.30)	BKG(	6.18)	LPT(	1.92)
14	3	118	6.22	11.64	9.97	ASI(	0.12)	BKG(	6.76)	LPT(	2.06)
15	3	121	3.67	4.07	7.54	ASI(	0.87)	BKG(	3.67)	LPT(	2.10)
16	3	120	3.27	3.84	7.87	ASI(	0.14)	BKG(	3.74)	LPT(	2.20)
17	3	118	3.68	3.74	9.77	ASI(	1.09)	BKG(	4.48)	LPT(	2.04)
18	3	122	4.59	4.53	9.33	ASI(	1.33)	BKG(	4.68)	LPT(	2.25)
19	3	121	3.75	4.34	7.27	ASI(	0.11)	BKG(	3.77)	LPT(	2.26)
20	3	119	10.55	10.74	6.96	ASI(	0.13)	BKG(	6.95)	LPT(	2.45)
21	3	118	10.10	4.93	13.50	ASI(	0.12)	BKG(	7.11)	LPT(	2.27)
22	3	119	6.29	5.80	14.11	ASI(	0.13)	BKG(	6.89)	LPT(	2.12)
23	3	121	4.00	5.17	7.65	ASI(	0.13)	BKG(	4.06)	LPT(	2.23)

Rapid Combination Requirements

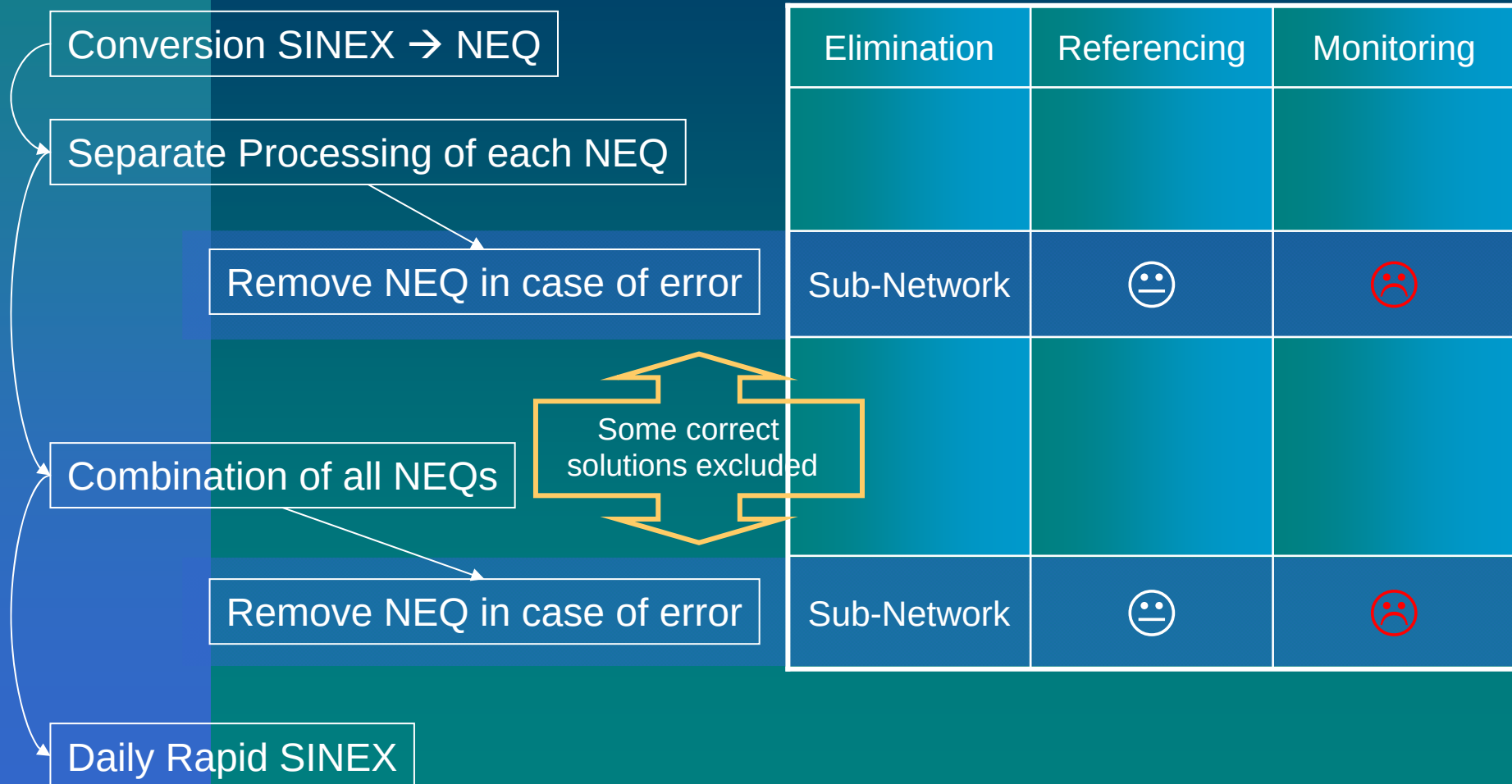
- Automated processing according to fixed schedule
- No manual interaction for day-to-day processing
- Automated event handling
 - Processing abort due to
 - ❖ Format error in SINEX file
 - ❖ Numerical problem in a single contribution
 - ❖ Numerical problem in the combination of all contributions
 - Clear objective needed to respond on processing abort
 - ❖ Generating a reference solution→ eliminate outliers
 - ❖ Monitoring task→ keep outliers included

Product Objectives

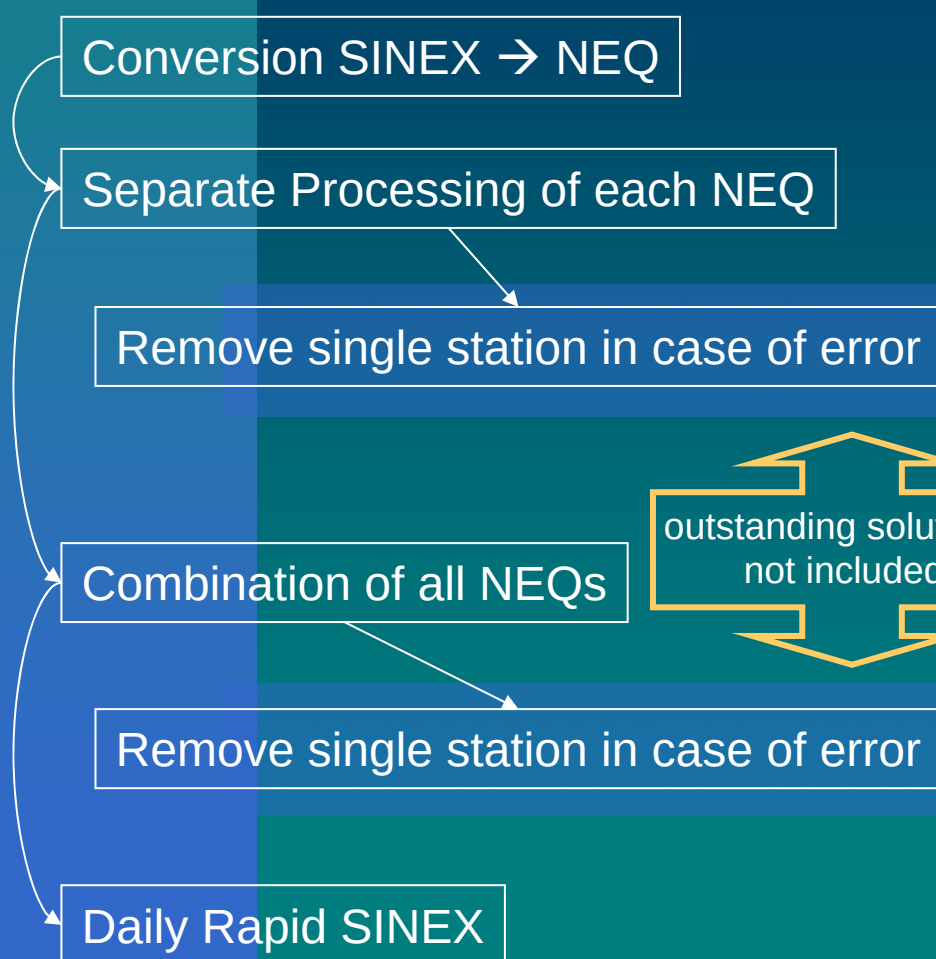
	Referencing	Monitoring
Final Hourly		X
Rapid Daily	X	X
Rapid Weekly (IGR)	X	X
Final Daily	X	
Rapid Weekly (IGS)	X	
Final Weekly	X	

- Outlier Handling in „rapid daily“ and „rapid weekly (IGR)“ is a critical issue
- Majority of missing rapid combinations product are of type „rapid daily“

Current Event Handling – Daily Rapid Combination



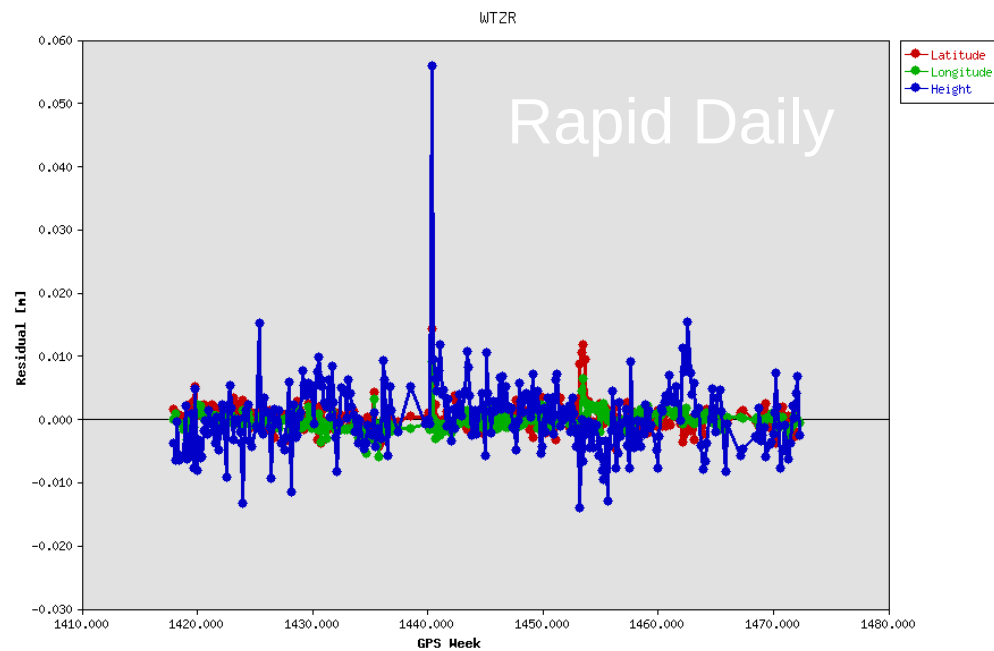
Alternative Event Handling – Daily Rapid Combination



Elimination	Referencing	Monitoring
single-station	☺	☹
single-station	☺	☹

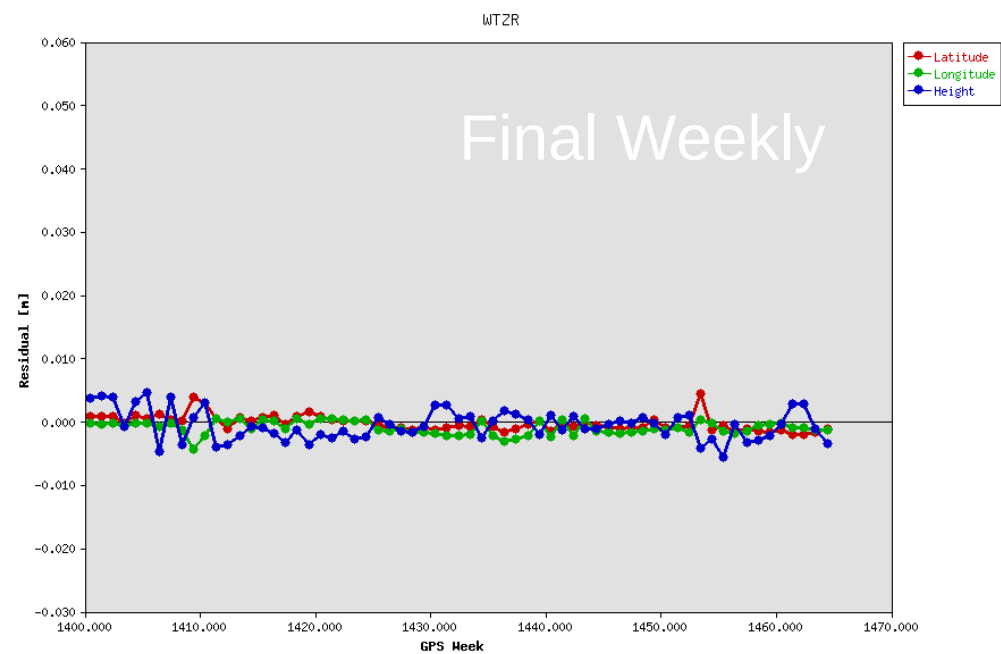
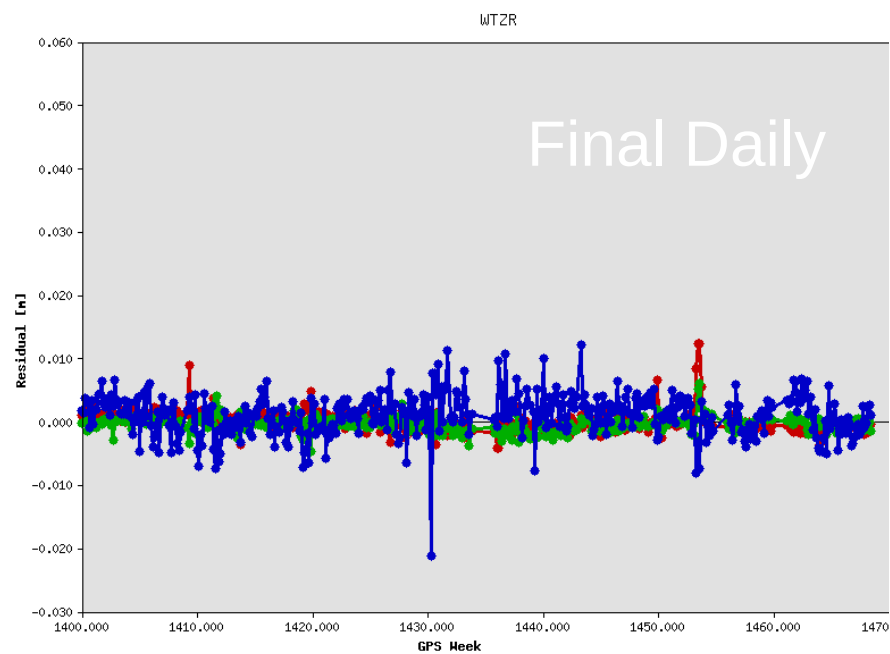
More Product Objectives

- Network solution:
 - Single bad performing stations may degrade a complete sub-network (LAC solution)
 - It is NOT possible to keep (significant) bad solutions in the combination for monitoring purpose
 - The combined solution validates coordinates of good performing sites, BUT no information for absent sites (possibility of no or bad data)
- Single point solution:
 - Provides even outstanding single station solutions for monitoring purpose (→ PPP discussion)



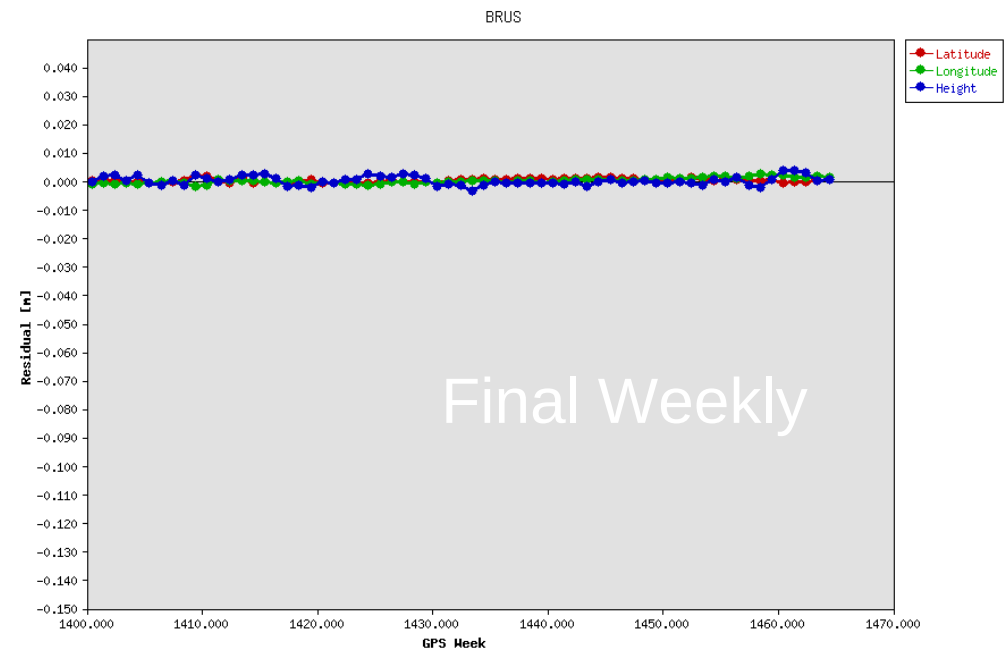
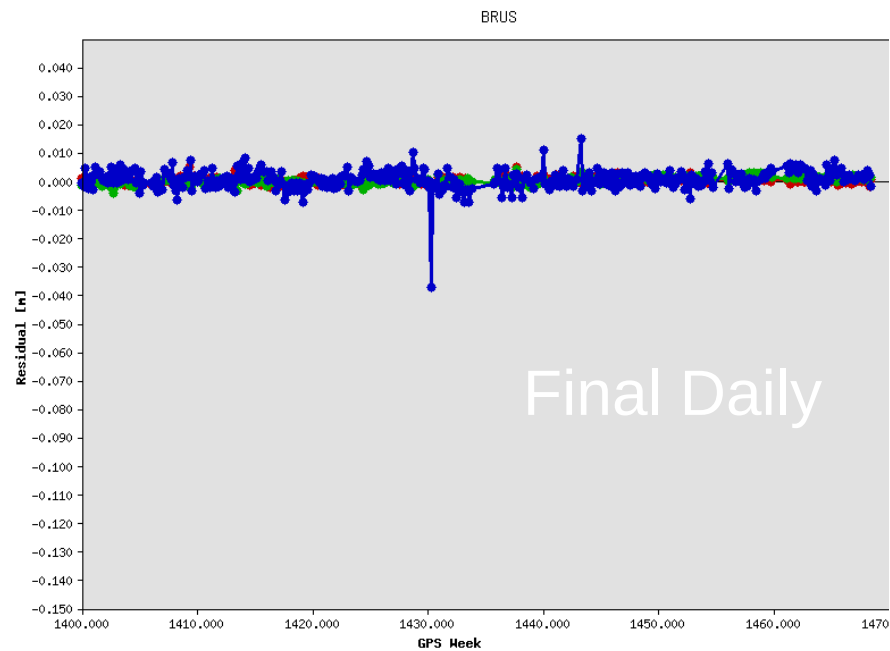
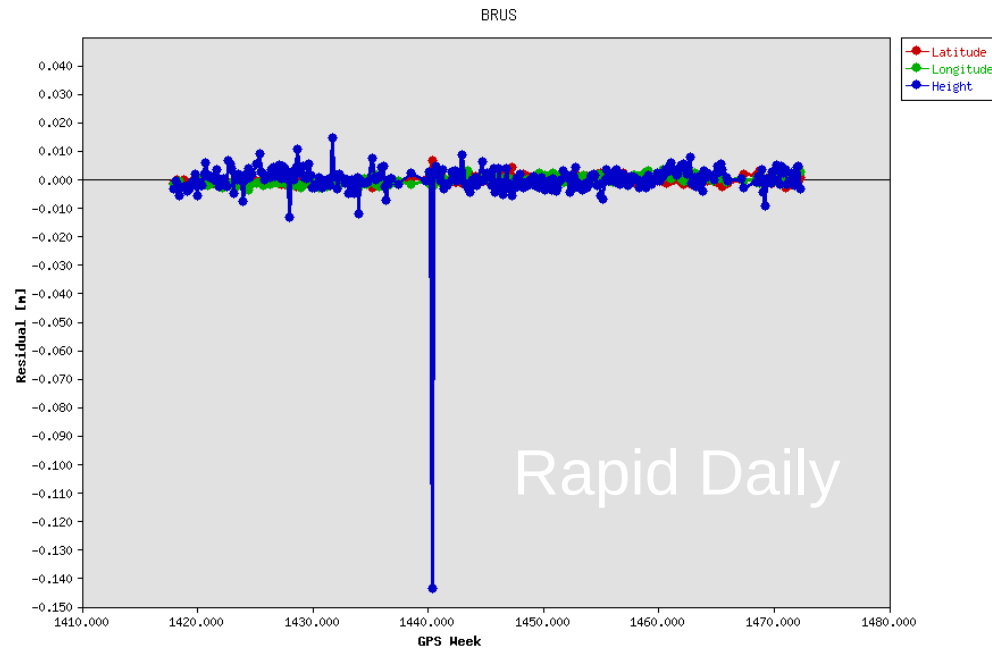
WTZR Time Series

- daily/weekly vs. combined (NEQ stacking)



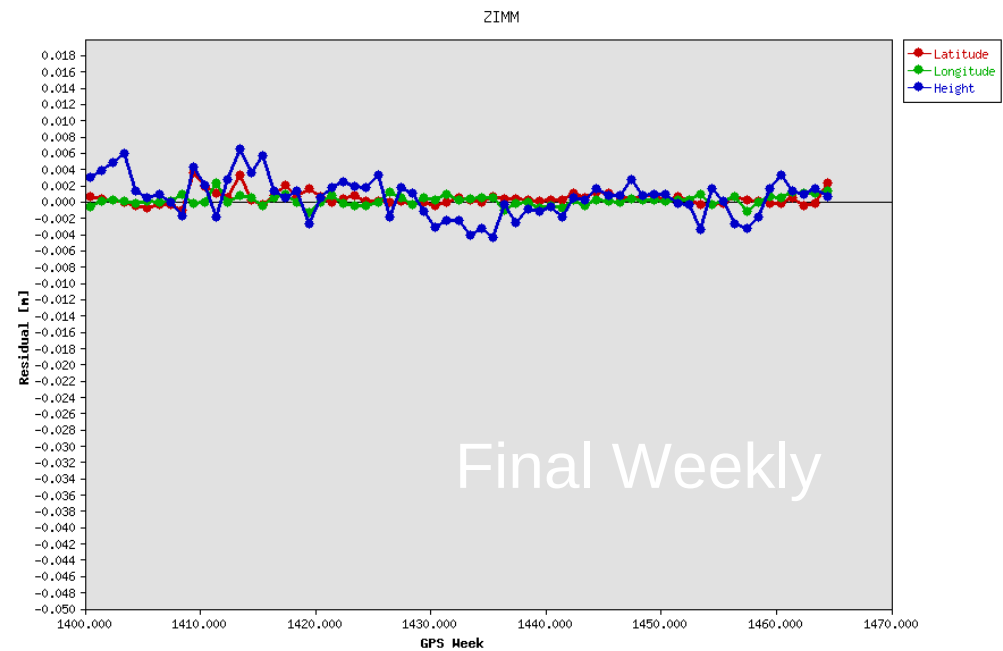
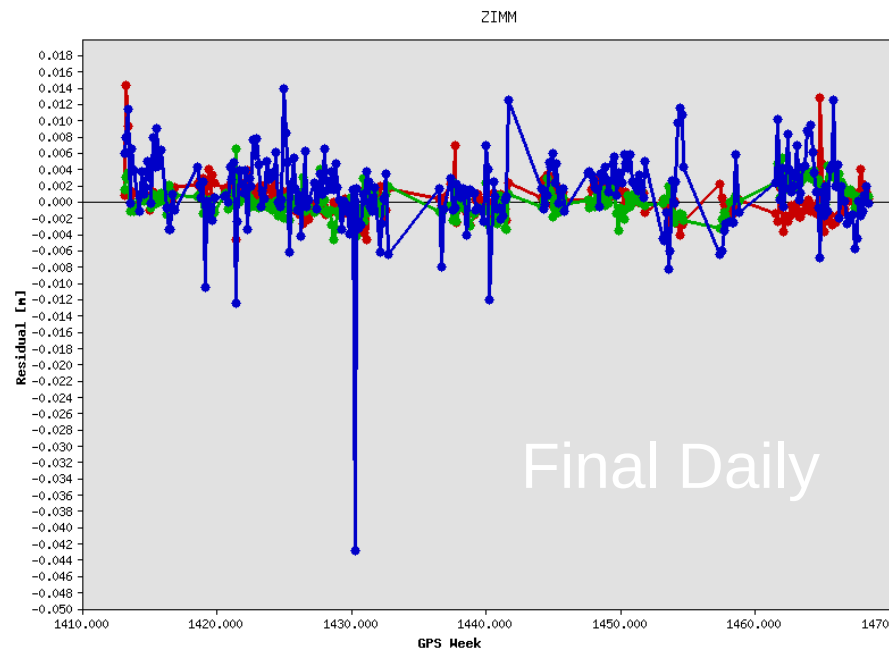
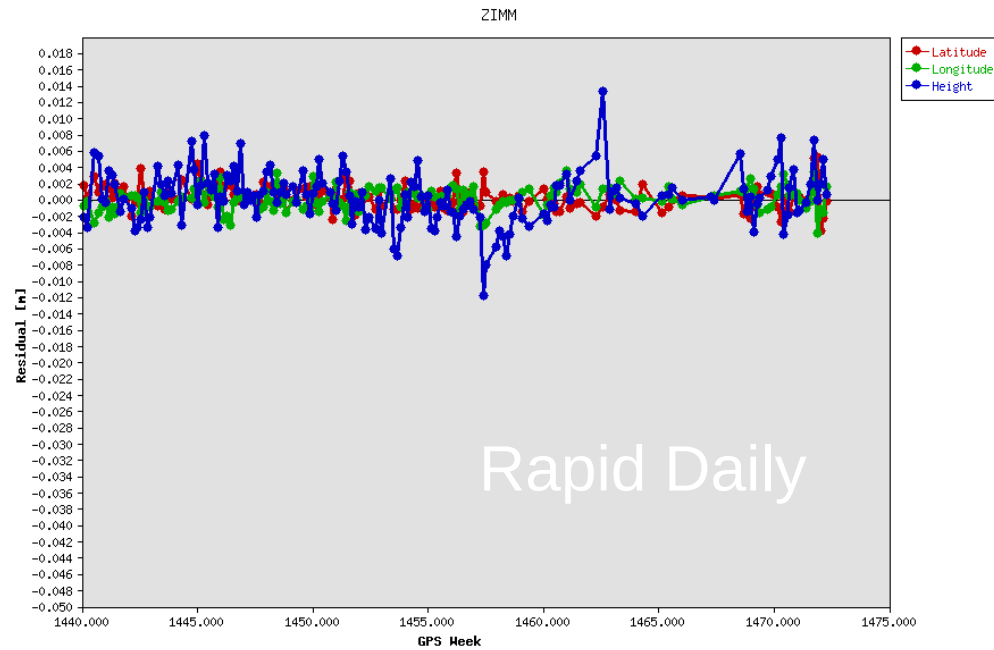
BRUS Time Series

- daily/weekly vs. combined (NEQ stacking)



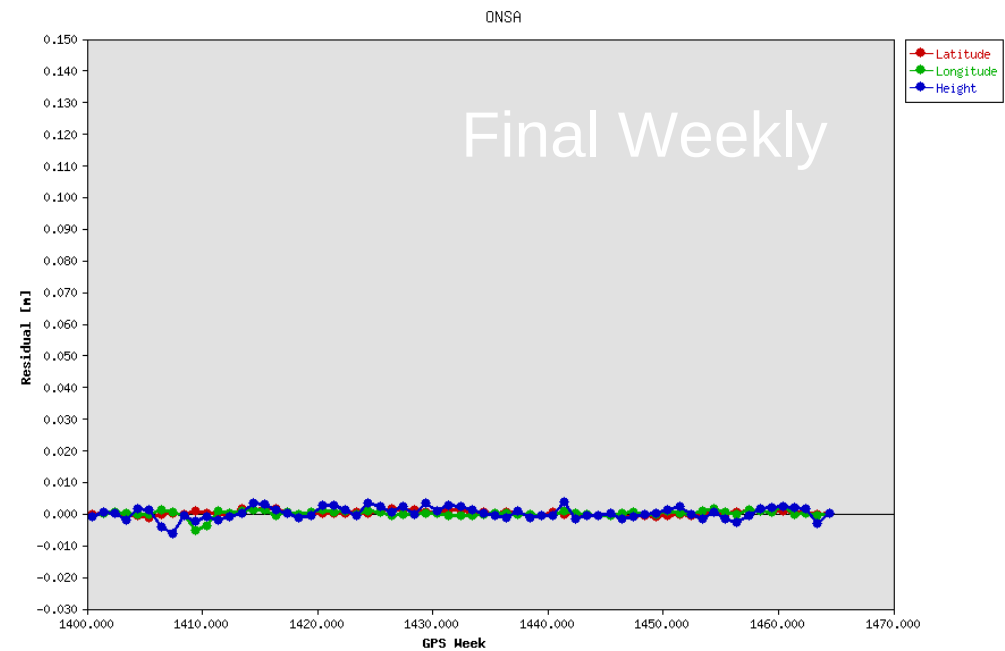
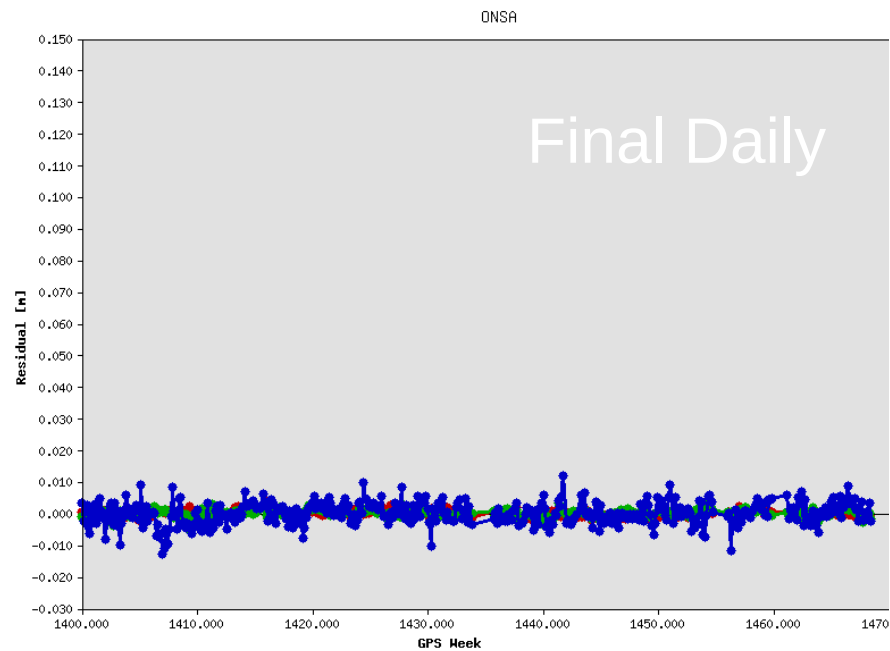
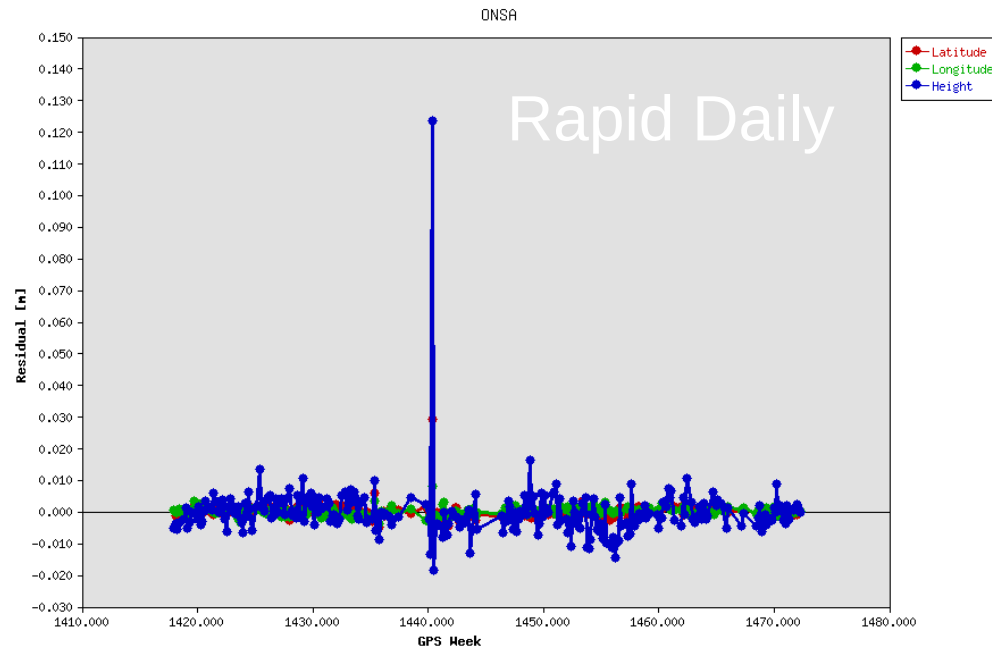
ZIMM Time Series

- daily/weekly vs. combined (NEQ stacking)



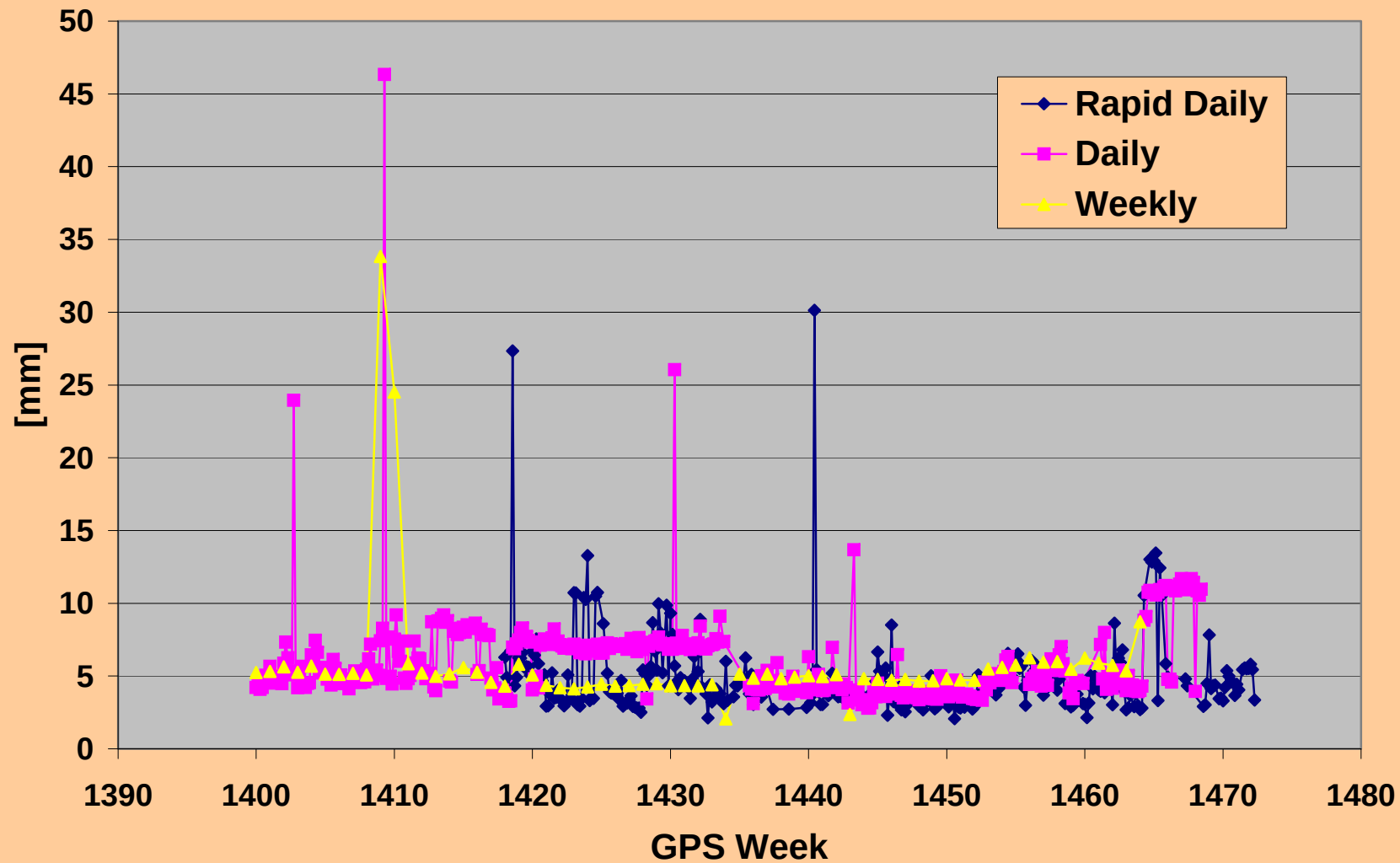
ONSA Time Series

- daily/weekly vs. combined (NEQ stacking)



Network Comparison

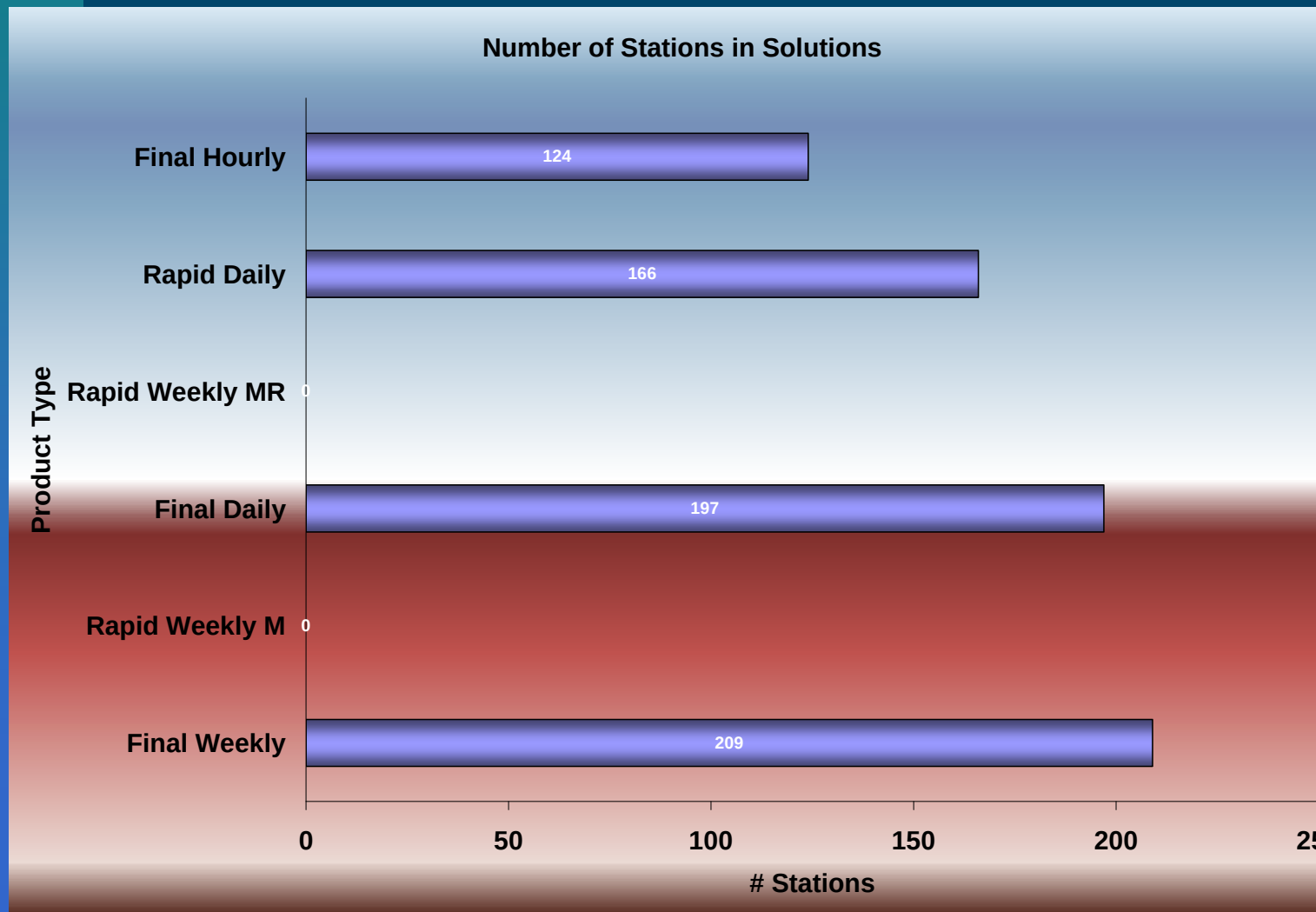
RMS Helmert Transformation daily/weekly vs. combined



Usage of products

Station Coordinates Product Type	Proposed Usage
Final weekly	Final reference
Final weekly M (final daily combination)	Contribution to IGS Associate Analysis Centres ??
Final daily	High resolution final reference
Rapid daily	Short latency, high quality coordinates

Station Counting since week 1400



Next Steps

- Extension to all EPN sites ?
- Product announcement ?
- Discussion of monitoring objective
 - Outlier handling?
 - Hourly Plots at EPN-CB or BKG-DC ?
 - Harmonisation of hourly analysis specifications ?
 - Establishment of „alert system“ ?

Thank you